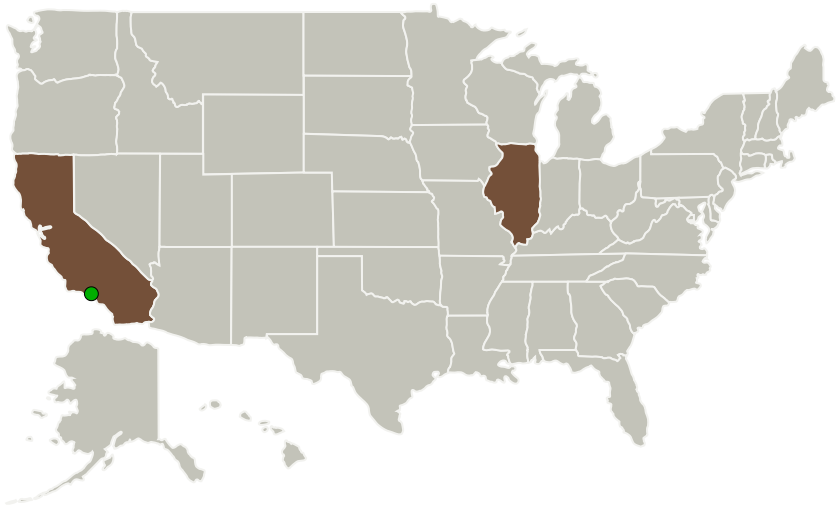
Fiber Fed Advanced Pulsed Plasma Thruster (APPT), Phase I

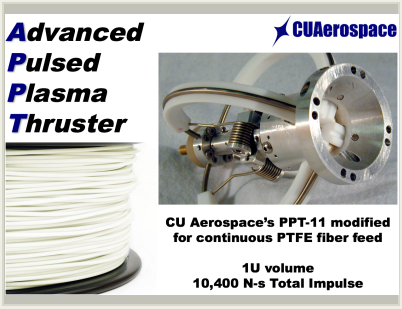
Completed Technology Project (2017 - 2017)

Project Introduction

CU Aerospace (CUA) proposes the development of the Advanced Pulsed Plasma Thruster (APPT) that will enable cis-lunar and deep space missions for small satellites. While classic PPT technology is mature, it has historically been limited by its size and propellant load to small Delta-V applications. A recent advancement by CUA, Monofilament Vaporization Propulsion (MVP), uses extrusion 3D printing technology to provide polymer propellant to an electrothermal thruster. APPT will leverage this advancement, using PTFE fiber to allow for class-leading propellant capacity and more reliable feed than previous PPT designs. APPT is inherently safe, containing no pressurants or hazardous materials, significantly reducing range safety concerns. A 1U APPT, operating at 1200 seconds Isp, will provide 10,400 N-s total impulse, allowing for 1,400 m/s Delta-V for an 8 kg CubeSat. Increasing to a 2U form factor increases total impulse to 30,000 N-s, allowing for a Delta-V exceeding 4 km/s. CUA anticipates delivering to NASA an integrated system by the end of Phase II which includes the advanced thruster head, PTFE filament feed system, and an ACS subsystem.

Primary U.S. Work Locations and Key Partners





Fiber Fed Advanced Pulsed Plasma Thruster (APPT), Phase I Briefing Chart Image

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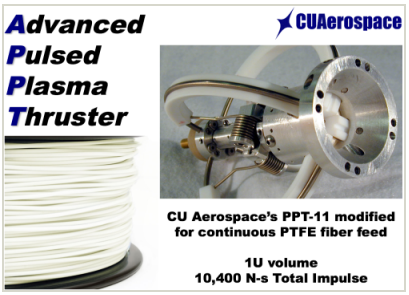
Organizations Performing Work	Role	Type	Location
CU Aerospace, LLC	Lead Organization	Industry	Champaign, Illinois
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Illinois

Images



Briefing Chart Image
Fiber Fed Advanced Pulsed Plasma Thruster (APPT), Phase I Briefing Chart Image *(https://techport.nasa.gov/image/127267)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
CU Aerospace, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

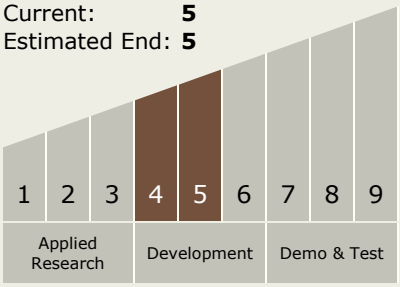
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Curtis Woodruff

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System